REMARKS

Claims 1, 2, 5-11, 13-23, and 29-30 are now pending in the application. Independent Claims 1 and 29 have been amended. Support for the amendments to the claims can be found throughout the specification as originally filed and at Paragraphs 31, 44, 59, and Figures 8, 9, and 12, for example.

The amendments to Claims 1 and 29 are similar to the amendments previously introduced in response to the non-final office action. Moreover, the claims remain directed to fuel cell systems and now explicitly define such a fuel cell system to include a fuel cell stack comprising a heating element. In this regard, Applicants submit that the amendments to Claims 1 and 29 do not raise an issue of new matter, nor should they require any additional searching. Further, Applicants believe that these amendments will place the application in condition for allowance and/or in better form for appeal. The Examiner is respectfully requested to enter these amendments after-final and to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 2, 5-11, 13-15, 17-23, 29 and 30 stand rejected under 35 U.S.C. § 103(a) as being anticipated by Kobayashi et al. (U.S. Pat. Pub. No. 2002/0098396) (hereinafter "Kobayashi") in view of Heung (U.S. Pat. No. 6,015,041) (hereinafter "Heung"). This rejection is respectfully traversed.

Claim 16 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kobayashi in view of Heung, as applied to Claim 15 above, and further in view of Shreir

et al. (Corrosion (3rd Edition)) (hereinafter "Shreir"). This rejection is respectfully traversed.

Independent Claims 1 and 29 have been amended to recite a fuel cell stack comprising a heating element, where the heating element is in contact with, as well as heat transfer relationship with, at least one component of the fuel cell stack. As described in Applicants' specification, the integrated and renewable heating element provides self-regulated heating for a fuel cell stack corresponding to the fuel cell system operation, without the need for additional control systems.

Neither the Koyabashi nor the Heung references describes or suggests an integrated heating element that is included within a fuel cell stack and is both in contact and heat transfer relationship with a component of the stack to provide heating. Both the Koyabashi and Heung heating systems provide independent heating systems that heat a coolant fluid for use with a fuel cell system, but, neither reference describes or suggests a heating element that can be directly integrated into a fuel cell stack.

Furthermore, both the Koyabashi and Heung references teach away from the claimed invention. Non-obviousness is supported in situations where references teach away from the claimed invention. *See e.g., KSR Int'l Co. v. Teleflex Inc.,* 127 S.Ct. 1727, 1740 (2007). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference... would be led in a direction divergent from the path that was taken by the applicant." *In re Kahn*, 78 USPQ.2d 1329, 1338 (Fed. Cir. 2006) *citing In re Gurley*, 31 USPQ.2d 1130 (Fed. Cir.1994). Both the Koyabashi and Heung references independently teach away from a heating element that is directly integrated into a fuel cell stack.

The Heung reference provides an independent heating element that heats a fluid to transfer heat. Col. 5, lines 19-23. Further, Heung states that a preferred embodiment has an insulation layer 38 surrounding the exterior of the hydrogen storage container 20. Figure 1A; Col. 5, lines 12-13. "Such insulation 38 helps prevent heat transfer from or to the ambient environment that may affect hydrogen absorption or desorption." Col. 5, lines 13-15. Accordingly, the Heung reference explicitly teaches away from direct heat transfer, by specifying that heat transfer with the surrounding environment should be avoided. As such, the insulated heating element of Heung would be inoperable as a direct heating element within a fuel cell stack.

Similarly, the Koyabashi reference specifies that "the outside of MH [metal hydride] tank 31 is covered with a water-cooling jacket, within which the cooling water for FC [fuel cell] 10 flows. Consequently, the heat generated during the course of occluding hydrogen in the hydrogen-occlusion alloy is transmitted to the cooling-water of FC 10." Paragraph [0089]. The Koyabashi reference thus provides a metal hydride storage vessel having an aluminum alloy that is covered by a water-cooling jacket, where heat is indirectly transferred via "heat transmitting means." *See e.g.*, Koyabashi Paragraphs [0023] and [0089]. Such a covered container would be inoperable for use as a direct heating element in a fuel cell stack, which in certain aspects, requires physical contact between the heating element and adjacent components to affect heat transfer.

Hence, the claimed invention would be rendered inoperable if either of the heating elements of Koyabashi and Heung were employed in such a manner, as they are respectively shielded from direct contact with an external body. Obviousness

cannot be predicated on a combination of references that produces a seemingly inoperable device. *McGinley v. Franklin Sports*, 60 USPQ.2d 1001, 1010 (Fed. Cir. 2001) *citing In re Sponnoble*, 160 USPQ 237, 244 (CCPA 1969). Storage vessels having jackets or insulating layers could not be employed within a fuel cell stack for contact with a fuel cell component to transfer heat thereto.

Thus, the Koyabashi and the Heung references reiterate the state of the prior art, in that they teach independent heating systems that rely on indirect heating of a fuel cell via a coolant/fluid, which involves a significant heat sink. In contrast, the presently claimed invention provides an integrated heating element within a fuel cell, which eliminates additional processing and control systems and enhances heat transfer efficiency to and from the fuel cell stack. See for example, Applicants' specification at Paragraphs 33-34. Further, the fuel cell stacks having at least one heating element as claimed have not only the ability for direct heat transfer, but are also capable of integration into a stack by contacting other fuel cell stack components due to selection of materials and heating element design that provides sufficient electrical conductivity for incorporation into a fuel cell stack.

The Shreir reference does not account for the deficiencies of the Koyabashi and Heung references, as it merely describes corrosion resistance properties of aluminum based alloys. Shreir fails to provide any apparent reason to provide a heating element in a fuel cell stack as claimed.

Thus, the prior art teaches away from the claimed invention and would be inoperable if used in accordance with the claimed invention; and as such, none of the Koyabashi, Heung, and/or Shreir references render the claimed invention as obvious.

Accordingly, Applicants respectfully request reconsideration of the rejections and allowance of independent Claims 1 and 29 and their respective dependent Claims 2, 5-11, 13-23 and 30.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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